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ABSTRACT

The original norms for the 40-item Stress Response Scale (SRS) were established on children aged 5-14 years and are reported by age and gender. While the norm group age range is appropriate for the clinical screening intent of the instrument, it is restrictive for studies that might examine the effects of stress on secondary school children or as a measure that can be used in a longitudinal study. The purpose of this study was to extend the norms of the SRS to the 15-18 year old age group. Parents of 100 students in each of four grades (grades 9 through 12) attending a suburban high school in central Texas were sent a cover letter, consent form, demographic data sheet, and the SRS. A total of 155 15 to 18-year-old subjects were included in the study. Both exploratory and confirmatory factor analyses were performed in order to validate the structure of the SRS with older children. Two procedures were used to determine the number of significant factors. The results indicate that the SRS can be used for longitudinal studies of children aged 5 to 18 years. While the results do not entirely replicate the personality theory model used for the original norm group, they provide confirmatory evidence on three of the five subscales. The study also highlights the utility of using LISREL confirmatory factor analysis techniques in understanding the structure of test data. Eight data tables are included. (RLC)

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An Extension of the Norms for the Stress Response Scale for Children

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Objectives

The Stress Response Scale (SRS) is a 40-item behavior rating scale constructed from a theoretical model of childhood stress response patterns (Chandler, 1983; Chandler & Shermis, 1986; Chandler, Shermis, & Marsh, 1985). Consistent with the theoretical model from which it is derived, the scale yields a total score, interpreted as a measure of the impact of stress on the child's behavioral adjustment, as well as scores for five subscales: Acting Out, Passive-Aggressive, Overactive, Dependent, and Repressed. The rating scale is typically filled out by a parent or teacher of the referred child and has been used successfully for clinical assessment and diagnosis.

The original norms for the SRS were established on children aged 5-14 years and are reported by age and gender. While the norm group age range is appropriate for the clinical screening intent of the instrument, it is restrictive for studies which might examine the effects of stress on secondary school children (e.g., dropping out, drug abuse) (Shermis & Coleman, 1989) or as a measure that can be used in a longitudinal study. The purpose of this study was to extend the norms of the SRS to the 15-18 year-old age group.

Theoretical Framework

The Stress Response Scale is based on the assumption that a child's response to stress may be seen as a behavioral response to a specific type of stimulus, characterized as a stressor (Chandler, 1983). One way to describe the possible responses to stress is to incorporate a more general model of personality functioning. The stress response model presented in Figure 1 describes the child's interaction with his/her environment along two widely used dimensions of personality.

Figures 1 & 2. Maladaptive behavior response patterns based on a two-dimensional theory of personality. Source: Chandler (1983)

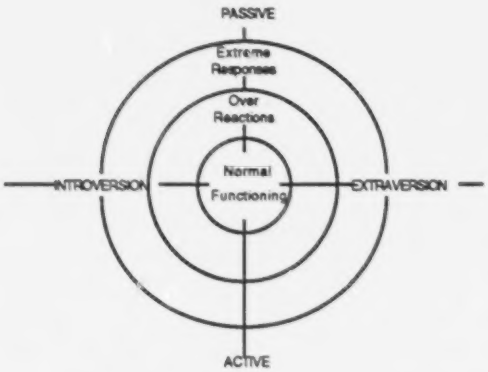


Figure 1
TWO DIMENSIONS OF PERSONALITY

Figure 2
FOUR COMMON RESPONSE PATTERNS TO STRESS

The model illustrates how the style a child might typically adopt in responding to str[illegible] can be seen on a continuum with extreme behavior at either end. As such, those difficulties usually regarded as problems of adjustment may be viewed as extreme examples of maladaptive efforts to cope. Based on this framework of personality functioning, the model predicts four patterns of behavior corresponding to each quadrant. As displayed in Figure 2, these patterns are labeled as Dependent, Impulsive, Passive-Aggressive, and Repressed.

An initial factor analytic study with a sample of clinic-referred children found a five-factor solution consonant with the types predicted by the model, which accounted for 62% of the variance (Chandler, 1982)[1]. Replication with a modified version of the scale and a larger group of clinic-referred children found a similar five-factor solution, accounting for 70% of the variance (Piso, 1981) and a corresponding factor structure was uncovered with a group of non-referred children (Chandler, 1983). A factor analytic study of the current version of the scale with non-referred children once again yielded the five-factor solution accounting for 64% of the variance (Chandler & Lundahl, 1983). Recent replication with a large sample (n=962) of

[1]The impulsive child was broken out into two separate categories: Impulsive (Overactive) and Impulsive (Acting Out)

randomly selected children has confirmed the five-factor solution (Shermis & Chandler, 1985) and accounted for 65% of the total variance.

The discriminant validity of the Stress Response Scale has been tested by a series of studies which examined the ability of scores on the scale to discriminate among various clinical groups and subgroups and their peers. Findings have consistently shown that referred children are rated significantly higher than non-referred children (Piso, 1981), and children in the general population of school children (Chandler, 1983; Kemmerer, 1984). Children assigned to special education classes for the emotionally disturbed are also given significantly higher ratings than their peers (Krotec, 1982). Further support for the discriminant validity of the scale was provided by a study which examined the relative frequency of various response patterns in both clinic-referred and randomly-selected populations (Chandler & Shermis, 1986).

In a study of criterion-related validity, SRS data were tested in predicting the psychiatric categories assigned to children (Chandler, Shermis and Marsh, 1985). When the SRS subscale scores were compared against the diagnoses assigned to a sample of clinic-referred children, they were found to reduce the error in predicting psychiatric group membership.

A reliability study using the ratings of teachers of 68 elementary school-aged children found a reliability correlation of .87 for the SRS total score (Mramor, 1988). Coefficient alpha was found to be .94 with the normative population.

Method

Subjects were selected from a suburban high school (grades 9 through 12) in central Texas using a simple random sampling procedure. Parents of 100 students in each of the four grades were sent a cover letter, consent form, demographic data sheet and the SRS. They were asked to complete the SRS and demographic data sheet and return it to the investigators. Data collection consisted of an initial mail out, a three week mail follow-up, and a phone

follow-up two weeks subsequent to the mail follow-up. One hundred and sixty-seven parents returned the forms (167/400 = 42 % response rate). However, due to missing data and age requirements (only fourteen through eighteen year olds were included in the study), 155 subjects were included in the study. The low response rate was in part due to the nature of the sampling frame. Approximately 12 percent of the mail outs resulted in invalid addresses/no forwarding information. Phone follow-ups confirmed that the list provided to the researchers was dated.

Data Source

Table 1 shows a breakdown of the subjects in the normative group by age and gender. A test was made to determine if ratings differed as a function of which parent filled out the information. Since there was not a significant difference between parental responses [$t(153) = .23$, $p < .82$], both mother (n=123) and father (n=32) responses were included in the normative group.

Table 1. Number of subjects in normative groups by age and gender.

Age	Male	Female	Total
15[2]	20	27	47
16	18	14	32
17	26	21	47
18	16	13	29
Total	80	75	155

Results

Both exploratory and confirmatory factor analyses were performed in order to validate the structure of the SRS with the older children. The exploratory factor analysis consisted of varimax principle components analysis that explained 56.9 percent of the total variance. The eigenvalues and proportion of total variance explained are presented in Table 2.

[2]This includes fourteen 14 year-olds who were in the ninth grade.

Table 2. Eigenvalues and proportion of total variance (Eigenvalues > 1.0) from the factor analysis of the Stress Response Scale (older children)

Factor	Lambda	Variance Proportion
1	11.694	.292
2	4.259	.106
3	2.833	.071
4	2.217	.055
5	1.524	.038
6	1.390	.035
7	1.281	.032
8	1.053	.026
9	1.006	.025

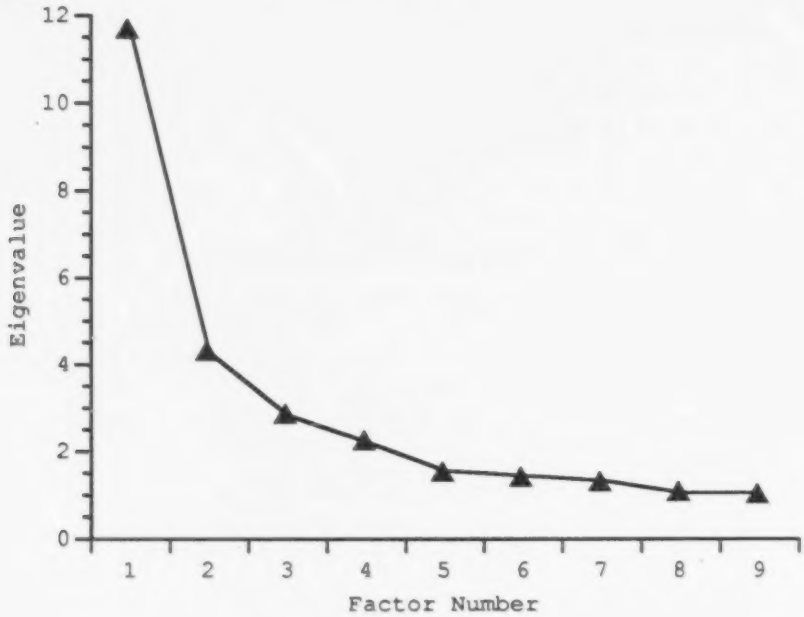
Using Kaiser's criterion ($\lambda \geq 1$), nine factors were identified and accounted for a total of 68.4 percent of the total test variance. Of the proportionate variance contributions, almost 40 percent the variance is accounted for by the first factor with the remaining 60 percent being accounted for by the other significant factors.

Two procedures were used to determine the number of significant factors. The general rule-of-thumb of including factors explaining more than five percent of the total variance was combined with an inspection of the scree plot of eigenvalues. The scree plot from this factor analysis is displayed in Figure 3 and suggests a four factor solution, accounting for 52.8 percent of the total variance. Based on the two criteria, a four-factor solution was extracted.

An inspection of the item-to-factor loadings revealed that three of the subscales [Impulsive(Overactive), Impulsive(Acting Out), and Passive-Aggressive] appeared to be very similar to that of the younger group. Two subscales (Repressed, Dependent) were problematic and did not replicate well.

A confirmatory factor analysis using LISREL was performed yielding similar results. The *a priori* model specification was rejected [$\chi^2(514) = 1553.44$, $p < .05$]. However, when model parameters were freed on the Repressed and Dependent subscales using a *post hoc* procedure, the data/model fit dramatically improved.

Figure 3. Scree plot from the factor analysis of the Stress Response Scale (older children)



While the original factor structure was not entirely replicated, there was enough of a relationship to proceed with establishing experimental norms for the older age group. Tables 3 & 4 show the means and standard deviations for the Total SRS in addition to the subscale scores for both males and females. Table 5 lists average total raw scores by age and gender. Table 6 summarizes ranges of risk, based on total scores. This information is useful for screening purposes. Finally tables 7 & 8 list raw scores, z-scores, t-scores and percentiles for total SRS scores by gender.

Table 3. Means and standard deviations of SRS subscale scores for males in the normative group (n=80).

Score	$\bar{X}$	SD
Total Raw	81.45	13.24
IMP (A)	23.20	9.30
P-A	24.15	11.24
IMP (O)	24.81	4.33
REP	10.89	4.98
DEP	13.95	4.18

Table 4. Means and standard deviations of SRS subscale scores for females in the normative group (n=75).

Score	$\bar{X}$	SD
Total Raw	84.29	13.96
IMP (A)	25.15	10.54
P-A	20.24	8.89
IMP (O)	26.09	4.27
REP	11.85	4.30
DEP	12.91	3.52

Table 5. Means and standard deviations for total raw scores by age and gender.

Age	Males (n=80)		Females (n=75)		Total (n=155)	
15	79.25	11.17	85.41	15.27	82.79	13.86
16	81.06	13.41	82.21	11.56	81.56	12.45
17	78.54	11.73	85.43	14.80	81.62	13.49
18	89.38	15.60	82.39	12.79	86.24	14.66
Total	81.45	13.24	84.29	13.93	82.83	13.61

Table 6. Ranges of risk based on total scores

	Males				Females			
Interpretation	15	16	17	18	15	16	17	18
Little evidence to suggest further study	0-79	0-81	0-79	0-89	0-85	0-82	0-85	0-82
Possible evidence to suggest further study	80-90	82-94	80-90	90-105	86-101	83-94	86-100	83-95
Probable evidence to suggest further study	91+	95+	91+	106+	102+	95+	101+	96+

Table 7. Raw scores, z-scores, t-scores, and percentiles for Total SRS (males).

Raw	Z	T	%ile	Raw	Z	T	%ile	Raw	Z	T	%ile
40	-3.13	18.7	.09	74	-.56	44.4	28.77	108	2.01	70.1	97.78
41	-3.06	19.4	.11	75	-.49	45.1	31.21	109	2.08	70.8	98.12
42	-2.98	20.2	.14	76	-.41	45.9	34.09	110	2.16	71.6	98.46
43	-2.90	21.0	.19	77	-.34	46.6	36.69	111	2.23	72.3	98.71
44	-2.83	21.7	.23	78	-.26	47.4	39.74	112	2.31	73.1	98.96
45	-2.75	22.5	.30	79	-.19	48.1	42.47	113	2.38	73.8	99.13
46	-2.68	23.2	.37	80	-.11	48.9	45.62	114	2.46	74.6	99.31
47	-2.60	24.0	.47	81	-.03	49.7	48.80	115	2.53	75.3	99.43
48	-2.53	24.7	.57	82	.06	50.6	52.39	116	2.61	76.1	99.55
49	-2.45	25.5	.71	83	.12	51.2	54.78	117	2.69	76.9	99.64
50	-2.38	26.2	.87	84	.19	51.9	57.53	118	2.76	77.6	99.71
51	-2.30	27.0	1.07	85	.27	52.7	60.64	119	2.84	78.4	99.77
52	-2.22	27.8	1.32	86	.34	53.4	63.31	120	2.91	79.1	99.82
53	-2.15	28.5	1.58	87	.42	54.2	66.28	121	2.99	79.9	99.86
54	-2.07	29.3	1.92	88	.49	54.9	68.79	122	3.06	80.6	99.89
55	-2.00	30.0	2.28	89	.57	55.7	71.75	123	3.14	81.4	99.92
56	-1.92	30.8	2.74	90	.65	56.5	74.22	124	3.21	82.1	99.93
57	-1.85	31.5	3.22	91	.72	57.2	76.42	125	3.29	82.9	99.95
58	-1.77	32.3	3.84	92	.80	58.0	78.81	126	3.36	83.6	99.96
59	-1.70	33.0	4.46	93	.87	58.7	80.78	127	3.44	84.4	99.97
60	-1.62	33.8	5.26	94	.95	59.5	82.89	128	3.52	85.2	99.98
61	-1.54	34.6	6.18	95	1.02	60.2	84.61	129	3.59	85.9	99.98
62	-1.47	35.3	7.08	96	1.10	61.0	86.43	130	3.67	86.7	99.99
63	-1.39	36.1	8.23	97	1.17	61.7	87.90	131	3.74	87.4	99.99
64	-1.32	36.8	9.34	98	1.25	62.5	89.44	132	3.82	88.2	99.99
65	-1.24	37.6	10.75	99	1.33	63.3	90.82	133	3.89	88.9	99.99
66	-1.17	38.3	12.10	100	1.40	64.0	91.92	134	3.97	89.7	99.99
67	-1.09	39.1	13.79	101	1.48	64.8	93.06	135	4.04	90.4	99.99
68	-1.02	39.8	15.39	102	1.55	65.5	93.94	136	4.12	91.2	99.99
69	-.94	40.6	17.36	103	1.63	66.3	98.84	137	4.20	92.0	99.99
70	-.86	41.4	19.49	104	1.70	67.0	95.54	138	4.27	92.7	99.99
71	-.79	42.1	21.48	105	1.78	67.8	96.25	139	4.35	93.5	99.99
72	-.71	42.9	23.89	106	1.85	68.5	96.78	140	4.42	94.2	99.99
73	-.64	43.6	26.11	107	1.93	69.3	97.32				

Table 8. Raw scores, z-scores, t-scores, and percentiles for Total SRS (females).

Raw	Z	T	%ile	Raw	Z	T	%ile	Raw	Z	T	%ile
40	-3.18	18.2	.07	74	-.74	42.6	22.96	108	1.70	67.0	95.54
41	-3.11	18.9	.09	75	-.67	43.3	25.14	109	1.77	67.7	96.16
42	-3.04	19.6	.12	76	-.60	44.0	27.43	110	1.85	68.5	96.78
43	-2.96	20.4	.15	77	-.52	44.8	30.15	111	1.92	69.2	97.26
44	-2.89	21.1	.18	78	-.45	45.5	32.64	112	1.99	69.7	97.67
45	-2.82	21.8	.24	79	-.38	46.2	35.20	113	2.06	70.6	98.03
46	-2.75	22.5	.30	80	-.31	46.9	37.83	114	2.13	71.3	98.34
47	-2.68	23.2	.37	81	-.24	47.6	40.52	115	2.20	72.0	98.61
48	-2.61	23.9	.45	82	-.16	48.4	43.64	116	2.28	72.8	98.87
49	-2.53	24.7	.57	83	-.09	49.1	46.41	117	2.35	73.5	99.06
50	-2.46	25.4	.69	84	-.02	49.8	49.20	118	2.42	74.2	99.22
51	-2.39	26.1	.84	85	.05	50.5	51.99	119	2.49	74.9	99.36
52	-2.32	26.8	1.02	86	.12	51.2	54.78	120	2.56	75.6	99.48
53	-2.25	27.5	1.22	87	.19	51.9	57.53	121	2.64	76.4	99.59
54	-2.17	28.3	1.50	88	.27	52.7	60.64	122	2.71	77.1	99.66
55	-2.10	29.0	1.79	89	.34	53.4	63.31	123	2.78	77.8	99.73
56	-2.03	29.7	2.12	90	.41	54.1	65.91	124	2.85	78.5	99.78
57	-1.96	30.4	2.50	91	.48	54.8	68.44	125	2.92	79.2	99.82
58	-1.89	31.1	2.94	92	.55	55.5	70.88	126	2.99	79.9	99.86
59	-1.82	31.8	3.44	93	.63	56.3	73.57	127	3.07	80.7	99.89
60	-1.74	32.6	4.09	94	.70	57.0	75.80	128	3.14	81.4	99.92
61	-1.67	33.3	4.75	95	.77	57.7	77.94	129	3.21	82.1	99.93
62	-1.60	34.0	5.48	96	.84	58.4	79.95	130	3.28	82.8	99.95
63	-1.53	34.7	6.30	97	.91	59.1	81.86	131	3.35	83.5	99.96
64	-1.46	35.4	7.21	98	.98	59.8	83.65	132	3.42	84.2	99.97
65	-1.38	36.2	8.38	99	1.06	60.6	85.54	133	3.50	85.0	99.98
66	-1.31	36.9	9.51	100	1.13	61.3	87.08	134	3.57	85.7	99.98
67	-1.24	37.6	10.75	101	1.20	62.0	88.49	135	3.64	86.4	99.99
68	-1.17	38.3	12.10	102	1.27	62.7	89.80	136	3.71	87.1	99.99
69	-1.10	39.0	13.57	103	1.34	63.4	90.99	137	3.78	87.8	99.99
70	-1.03	39.7	15.15	104	1.41	64.1	92.07	138	3.86	88.6	99.99
71	-.95	40.5	17.11	105	1.49	64.9	93.19	139	3.93	89.3	99.99
72	-.88	41.2	18.94	106	1.56	65.6	94.06	140	4.00	90.0	99.99
73	-.81	41.9	20.90	107	1.63	66.3	94.84				

Educational/Scientific Importance of the Study

This study was important for three reasons. First, it established experimental norms for a popular and useful screening tool, the *Stress Response Scale*. Researchers using target populations which incorporate both primary *and* secondary school children can now employ the SRS for assessing maladaptive coping behaviors. Moreover, the instrument may now be used for

longitudinal studies on children aged 5-18. Second, while the results did not entirely replicate the personality theory model used for the original norm group, it did provide confirmatory evidence on three of the five subscales. Deficiencies in the sample size or the rarity of the repressed and dependent behavior categories (Shermis & Chandler, 1987) may have contributed to the unreliability of these subscales. In addition, older children may simply manifest maladaptive behavior with the impulsive and passive-aggressive responses. Finally the study highlighted the utility of using LISREL confirmatory factor analysis techniques in understanding the structure of test data.

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